

REMARKS/ARGUMENTS

Claims 1-19 stand rejected in the outstanding Official Action. Claims 1-3, 8, 12, 14 and 17 have been amended and newly written claim 20 added for consideration. Therefore, claims 1-20 are the only claims remaining in the application.

The Examiner's acknowledgment of Applicant's claim for foreign priority and receipt of the certified copy of the priority document is very much appreciated. Similarly, the Examiner's indication of PTO acceptance of the previously filed formal drawings is appreciated. Finally, the Examiner's consideration of the cited prior art submitted in Applicants' previously filed Information Disclosure Statement is appreciated.

On page 2, section 2 of the Official Action, the Examiner suggests that headings be added to the application. It is also appreciated that the Examiner has brought the arrangement of the specification to the applicant's attention. It is noted that the objection to the arrangement appears to be an indication that the originally filed specification does not meet the formality requirements of the U.S. Patent and Trademark Office. The Patent Office is reminded that the U.S. Patent and Trademark Office must comply with all articles of the Patent Cooperation Treaty (PCT) including Article 27. It has been held that:

"if the rule and interpretation of the PTO conflicts with the PCT, it runs afoul of Article 27 of the PCT which provides in part:

- (1) No national law shall require compliance with requirements relating to the form or contents of the international application different from or additional to those which are provided for in this Treaty and the Regulations." Caterpillar Tractor v. Commissioner, 231 USPQ 590, 591 (EDVA 1986).

The Patent Office has referenced this decision in the Official Gazette dated September 9, 1986 (1070 TMOG 5).

As a consequence, the Patent Office may not require specification format changes as long as the originally submitted documents comply with the PCT requirements. Inasmuch as this specification was forwarded for WIPO, by definition, it meets the PCT requirements (they are not forwarded until they meet PCT requirements.). Therefore, the objection to the specification is respectfully traversed and reconsideration thereof is respectfully requested.

Notwithstanding the above, applicant has added headings and subheadings to the specification thereby obviating any further objection.

On page 3, section 3 of the Official Action, the specification is objected to because of the spelling of “splits.” The correction to the spelling in the specification is believed to obviate the objection.

On page 3, section 4, claim 1 is objected to, with the Examiner suggesting that “the same nominal direction” be changed to read “a same nominal direction.” This correction has been implemented, thereby obviating any further objection.

Independent claim 17 stands rejected under 35 USC §102 as being anticipated by Bauch (U.S. Patent 6,826,371). Claim 17 has been amended to more clearly define the method steps and the related structures used in the accomplishment of those steps. Applicants explicitly recite that the method is practiced using “an electromagnetic signal detector having a limited duty cycle on-time” for detecting receipt of electromagnetic signals.

As discussed in Applicants’ Background of the Invention portion of the specification, it is well known for electromagnetic energy emanating from an object to be detected as a signal by a passive detection system. It is also well known for an active detection system to detect an electromagnetic signal reflected by an object which has been illuminated by an electromagnetic

energy transmitter. However, Applicants have appreciated that a restriction of the “on-time” of a signal detector may improve noise performance and thus accuracy and sensitivity.

As described in the last paragraph on page 4 and the first paragraph on page 5 of Applicants’ specification, signal detectors of various designs are well known in the art and have a short duty cycle, also known as the “on-time.” There are benefits to minimizing the “on-time” of a signal detector, as this reduces detector noise and increases the maximum range capability of the entire signal detection system. However, it is essential that the detector on-time coincide with the arrival time of any incoming signal.

Applicants’ inventive method involves splitting any received signal into portions and transmitting those portions along a plurality of paths so as to delay the passage of the split signal along at least one or more of the paths. Optical delays are arranged along one or more of the paths so that a portion of the signal leaves each of the paths during the limited duty cycle on-time of the signal detector so it can detect that respective portion of the signal.

As discussed in Applicants’ specification on page 5, lines 15-32, there is a time-wise compression of signals received over a period of time into a shorter “duty cycle on-time” of the signal detector. As noted in the specification, “[t]he real time during which the signal or signals arrived at the optical fibre 12 has therefore been compressed into the shorter on-time of the signal detector 11.” As noted in the first paragraph on page 6 of the specification, an overall detector system can have a 100% duty cycle with a signal detector having a 10% “duty cycle on-time,” thereby providing the advantages of the limited “on-time” of the signal detector noted above.

Claim 17, as amended, clearly recites the limited duty cycle on-time and thus clearly distinguishes any prior art which has a 100% duty cycle, i.e., it is on all of the time. Claim 17

has been amended to recite the splitting of a received “electromagnetic signal” into portions and transmitting those portions along a plurality of paths where passage of the signal along some of the paths is delayed. The claim specifically requires that the signal detector have a “limited duty cycle on-time,” i.e., less than 100%, and that the signal passing along the paths is detected “during said limited duty cycle on-time” of the signal detector. As will be seen, this is absolutely the opposite of what is disclosed in the Bauch and other prior art references.

Bauch teaches a communication system and specifically a “variable rate differential phase shift keying (DPSK) communication system.” Because Bauch is a communication system, if the system has anything less than 100% duty cycle, i.e., it is on all the time, there is a chance that communications data will be missed and/or lost. Bauch demonstrates this requirement in Figures 3A-3I which show it to be in continuous operation, i.e., an un-limited duty cycle. In fact, non-continuous operation would result in Bauch losing data. While the Bauch reference does indeed time-shift portions of the incoming signal, it adds those portions on a continuous basis to build the coherent sum. Proper operation of the Bauch device requires continuous operation.

There is no disclosure in the Bauch reference of any “electromagnetic signal detector having a limited duty cycle on-time” and therefore it cannot teach the “detecting” step of claim 17, i.e., detecting the portion of the signal that leaves “each of said paths during said limited duty cycle on-time.” Accordingly, claim 17 as amended not only is not anticipated by Bauch, Bauch’s requirement of being “on” continuously would preclude any “limited duty cycle on-time.”

Thus, the Bauch reference not only fails to anticipate, but actually would lead one of ordinary skill in the art away from Applicants’ independent claim 17 and any further rejection thereof is respectfully traversed.

Claims 1-11, 13 and 15-18 stand rejected under 35 USC §103 as being unpatentable over Misek (U.S. Patent 4,079,246) in view of Buser (U.S. Patent 4,380,391) and Boivin (U.S. Patent 6,141,127). Applicants note that claim 1 has also been amended to positively recite an electromagnetic signal detector having “a limited duty cycle on-time” for detecting receipt of electromagnetic signals. This structural requirement of the claimed “signal detector” means that it is always on for less than 100% of the time and thus it is not a “continuous” operation detector.

As noted above in the discussion of the Bauch reference, the Applicants’ invention concerns a detector which has a limited duty cycle on-time, i.e., less than 100%. However, because of the claimed “at least two optical paths” and the first optical time delay within one of the two optical paths, signals received outside of the “limited duty cycle on-time” of the detector can still be detected because they are delayed so that they are actually received by the detector during the “limited duty cycle on-time.” Essentially, the job of the various embodiments of Applicants’ invention is to shift signals that would not be detected at all (because the detector is off due to its “limited duty cycle on-time”) and instead shift them into a time period occurring during the “limited duty cycle on-time” when they can be detected.

In the Misek patent, the receiver operates, like Bauch, continuously and there is no limited duty cycle on-time, i.e., less than 100%. In other words, to operate in the manner of the Misek reference, the detector, regardless of delays, must still be on 100% of the time and this, as in Bauch, would lead one of ordinary skill in the art directly away from Applicants’ claimed invention. The Examiner will appreciate that Misek uses multiple detectors, as discussed in column 2, lines 10-19, and the outputs from those multiple detectors are superimposed in order to get a version of coherent reinforcement of the original pulse instead of the stretched or smeared pulses that would otherwise be detected.

While the Examiner suggests that there is an “on-time” detector related to a “pulse width” in Misek, there is nothing to suggest that any of the detectors are switched off, especially as a signal could be coming in at any time. The detectors in Misek are continuously operated in order to receive the communication signals and therefore have an unlimited duty cycle, i.e., continuous, rather than the claimed “limited duty cycle on-time.”

Moreover, there is nothing in Misek which suggests that the optical delay results so that it “extends the operational range of said signal detector” as in claim 1 by “compressing the real time during which a signal can be received by one of said at least two optical paths into the on-time of said signal detector.” The pulse widths shown in Misek’s Figure 1 are merely transmitted pulses and the stretched or smeared pulse width 20 is what would be detected at the receiver if there were no bank of detectors 26 and delay lines 30 (see Figure 2 of Misek). The receiver 16 is still operational to detect receipt of signals at any and all times. The incoming pulse 20, as contended by the Examiner, can’t switch the receiver on or off. The continuous operation is an unlimited duty cycle for the Misek detector.

Furthermore, the Examiner’s admission that “Misek does not expressly teach the optical paths that receive an electromagnetic signal from the same nominal direction and then transit the received signal to a signal detector, and an optical time delay within one of the optical paths to delay the received optical signal and transmit the delayed signal to the detector” which occurs on page 7, second full paragraph, is very much appreciated. In addition to this admission and in view of the amendment to claim 1, Applicants would additionally have the Examiner admit that Misek does not teach any “limited duty cycle on-time” for any detector disclosed in the Misek reference. Applicants would further request that the Examiner admit that Misek, in requiring

continuous operation of all detectors, would lead one of ordinary skill in the art away from Applicants' claimed "limited duty cycle on-time."

To the extent the Examiner believes Buser teaches features missing from Applicants' claims, it is noted that Buser deals with the use of a train of very short (nanosecond) pulses to obtain both range and signature data for a target. It overcomes a similar problem to that overcome by the Misek reference, i.e., pulse broadening. Buser solves the problem by using a special transmitter for illuminating the target, i.e., a transmitter of exceedingly narrow pulses which can better be resolved in the reflected detected signal.

Again there is no suggestion in Buser of using a detector that is ever switched off, especially at a time when a signal could be expected to be received. While Buser does use a range gate to eliminate backscatter, this is only useful for excluding any received signal which is outside a time the detector output is considered useful, i.e., ground clutter from targets too close or too far from the target of interest.

While the Examiner appreciates that Buser uses different lengths of optical fiber to time multiplex the signals onto a single detector, this is to separate signals in time so that they are in consecutive time slots and not bringing them together into a "limited duty cycle on-time" as in the presently claimed invention. There is no disclosure that the detector is ever off in Buser. This always on feature of Buser is shown in the middle part of Figure 3 and discussed in the corresponding portion of the reference.

Thus, Buser fails to teach the missing features of Applicants' independent claim 1, i.e., the claimed "limited duty cycle on-time" for the detector and the optical delay which has an optical time delay "selected to extend the operational range of said signal detector" by compressing the real time into the "on-time of said signal detector."

The Examiner admits that “Buser uses the delay lines for separating signals from different ‘columnar segmented’ [sic].” The Examiner apparently believes that Boivin supplies the deficiencies noted above in the Misek and Buser references. However, Boivin relates to chirped pulse wavelength division multiplexing (WDM) used in a communication system. Figure 5 in Boivin shows the transmitter end of a communications link which uses a bank of delay lines to create time division multiplexing. That is, the delay lines deliver signals in different time slots. This is again the opposite of the effect of the delay lines specified in Applicants’ independent claims, i.e., it takes signals from different time slots (which may or may not overlap the “limited duty cycle on-time”) of the detector and sends them simultaneously, or at least overlapping in time, to the “limited duty cycle on-time” detector.

To the extent the Examiner understands that Boivin is somehow putting the time slots back on top of each other, this understanding is believed to be incorrect. The relevant mechanism is described at column 3, lines 4-8 which states “whereby an optical signal having a plurality of wavelength division multiplex channels is generated, split, delayed by a desired amount, modulated and then combined into a single signal such that individual WDM channels are in temporarily [timewise] spaced relation to one another.” This is not a statement of combining the WDM channels together into a single time period (i.e., the claimed “limited duty cycle on-time” of the claimed detector), but rather interleaving them into a signal with separated time slots representing the various WDM channels.

As noted above, it is clear that none of Misek, Buser or Boivin, separately or together, teaches the claimed features of Applicants’ amended claim 1 and therefore any further rejection of independent claims 1 and 17 or claims dependent thereon is respectfully traversed. Should the Examiner believe the above analysis to be in error, the Examiner is respectfully requested to

identify specifically where any one of the cited references teaches a detector “having a limited duty cycle on-time for detecting receipt of electromagnetic signals” or a first optical time delay which is selected “to extend the operational range of said signal detector by compressing the real time during which a signal can be received by one of said at least two optical paths into the on-time of said signal detector.” Absent such specific teaching identified in one of the cited references, Applicants will assume that the Examiner agrees that all features of Applicants’ independent claims 1 and 17 are not shown in the combination of references.

Moreover, even if the Examiner were able to show somehow that each of Applicants’ claimed features or method steps is shown somewhere in the one of the three references, this only meets the first of two evidentiary requirement on the Examiner’s part. The burden is still on the Examiner to provide the required “analysis” (see the Supreme Court decision in *KSR*) as to why one of ordinary skill in the art would pick and choose these features and then combine them in the manner of Applicants’ claims. All three references disclose continuous operation detectors in communication systems which preclude any “limited duty cycle on-time” detector from being used. This preclusion establishes that all three prior art references teach away from the claimed invention, thereby rebutting any *prima facie* case of obviousness made.

Claim 12 stands rejected under 35 USC §103 over the Misek/Buser/Boivin combination and further in view of Guscott (U.S. Patent 4,339,748) and Halldorsson (U.S. Patent 4,674,874). The Examiner makes no allegation that either of Guscott or Halldorsson suggest the missing feature of Applicants’ independent claim 1 from which claim 12 depends. Accordingly, even if all five references were combined, they do not disclose the detector “having a limited duty cycle on-time” or the optical time delay which is selected to extend the operational range of the signal

detector as noted in the claims. The above comments regarding claim 1 distinguishing over the Misek/Buser/Boivin combination is herein incorporated by reference.

Claim 19 stands rejected under 35 USC §103 as unpatentable over the Misek/Buser/Boivin combination in further view of Halldorsson. Inasmuch as claim 19 depends from claim 17, the above comments distinguishing claim 17 from the Misek/Buser/Boivin combination are herein incorporated by reference. Also as noted above, the Examiner does not allege that the missing method steps in Applicants' independent claim 17 are shown in the Halldorsson reference and therefore even if Halldorsson is combined with the previously discussed prior art combination, it cannot render obvious the subject matter of dependent claim 19. Accordingly, any further rejection of claim 19 is respectfully traversed.

The Examiner's indication of allowable subject matter in Applicants' dependent claim 14 is very much appreciated. Applicants have combined claim 14 with claim 13 and claim 1 from which it depends as newly written claim 20. In view of the indication of allowable subject matter in dependent claim 14, it is submitted that independent claim 20 is clearly allowable and notice to that effect is requested.

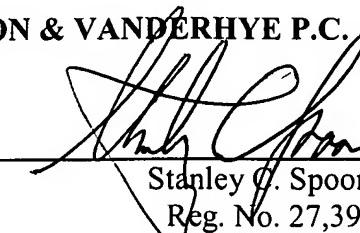
Having responded to all objections and rejections set forth in the outstanding Official Action, it is submitted that pending claims 1-20 are in condition for allowance and notice to that effect is respectfully solicited. In the event the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact applicant's undersigned representative.

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Respectfully submitted,

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